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Wim Van Houtum

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EXAMINER

TIMORY, KABIR A

ART UNIT

PAPER NUMBER

2611

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/537,068

Applicant(s)

VAN HOUTUM, WIM

Examiner

Kabir A. Timory

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

1. This office action is in response to the amendment filed on May 07, 2007.

Claims 1-21 are pending in this application and have been considered below.

### *Response to Arguments*

2. Applicant arguments filed on 4/20/2007 regarding 35 USC 112 second paragraph have been fully considered and they are persuasive; therefore, the rejection under 35 U.S.C. 112, second paragraph is withdrawn.

3. Applicant arguments filed on 4/20/2007 regarding "At the outset, Applicants note that the Office Action cites 'columns' in the applied art. The applied reference includes numbered pages and number paragraphs and not numbered columns. Clarification is respectfully requested, as Applicants are placed in a prejudicial position due to the confusion as to what portions of a rather voluminous document are being cited by the Examiner. (For example, page 5, lines 7-11 and paragraph [005] describe multiple antennae)", have been fully considered and they are persuasive. Examiner acknowledges the typographical error "**column**" should have been quoted as "**paragraph**". All errors regarding this argument are corrected in this office action. However, the prior art teaches all of the limitations for the rejected claims. Moreover,

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the rejection was made based on the entire content of the prior art. It is applicant's responsibility to read and understand the entire content of the prior art.

4. Applicant arguments regarding the rejection under 35 USC 102(e) as being anticipated by Tehrani, et al. (US Pub. Number 2002/0164963) have been fully considered but they are not persuasive. The examiner thoroughly reviewed Applicant's arguments but firmly believes that the cited reference reasonably and properly meets the claimed limitation as rejected.

**(1) Applicant's argument:** "The Office Action fails to cite in the disclosure of Tehrani, et al. of the featured signal path delay between the first and second transmitting antennae and the signal path delay between the third and fourth receiving antennae. Rather, the Examiner asserts that these delays are inherent to the disclosure. For at least the reasons discussed presently, Applicants respectfully submit that the Office Action has failed to establish that the missing features are inherent in the applied art".

**The examiner's response:** Path delays limitation is inherent because multipath delays between transmit and receive antennas are well known concept in radio frequency communication. One of ordinary skilled in the art would have clearly recognized that in wireless telecommunications, multipath is the signal propagation phenomenon that results in radio signals reaching the receiving antenna by two or more paths. Multipath causes interference, shift in phase and amplitude and also time delay

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of the received signal. This is a basic concept of radio frequency communication which is documented in many RF communication text books.

Furthermore, in paragraph 0066, lines 1-13, Tehrani, et al. clearly discloses that "The RF energy that is transmitted between antennas can experience destructive and constructive interference due to multiple paths taken by the energy with multiple delays on the way to a receive antenna". This provides a clear evidence for path delay between antennas and establishes a solid support for the inherency.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 1, 2, 4, 5, 9, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Tehrani et al. (US Pub Number 2002/0164963).

#### **Regarding claim 1:**

As shown in figure (1) Tehrani et al. discloses a data communication system comprising:

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- a transmitter having first and second transmitting antennae (figure 1, 120, 138, 140, paragraph 0044, lines 10-12), the signal path of the first antenna exhibiting a different delay than the signal path of the second antenna (this limitation is inherent because in a multipath environment, the signal takes different paths from the source to get to destination and each of these signal experiences different delays as a result each antenna experience different delays. Please see paragraph 0066, lines 1-13) (paragraph 005, lines 7-11); and
- a receiver having third and fourth receiving antennae (figure 1, 110, 122, 124, paragraph 0044, lines 10-12), the signal path of the third antenna exhibiting a different delay than the signal path of the fourth antenna (this limitation is inherent because in a multipath environment, the signal takes different paths from the source to get to destination and each of these signal experiences different delays as a result each antenna experience different delays. Please see paragraph 0066, lines 1-13) (paragraph 005, lines 7-11).

**Regarding claim 2:**

The data communication system of Claim 1, wherein:

- a nonzero delay of one of the signal paths of the first and second antennae is different from a nonzero delay of one of the signal paths of the third and forth antennae (this limitation is inherent because in a multipath environment, the signal takes different paths from the source to get to destination and each of these signal experiences different delays as a result each antenna experience different delays. Please see paragraph 0066, lines 1-13) (paragraph 005, lines 7-11)

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**Regarding claim 4:**

The data communication system of Claim 1, wherein:

- the transmitter further comprises a transceiver which is capable of both transmission and reception at different times by means of the first and second antennae (figure 1, 120, 138, 140, paragraph 0044, lines 10-12); and
- wherein the receiver further comprises a transceiver which is capable of both transmission and reception at different times by means of the third and fourth antennae (figure 1, 110, 122, 124, paragraph 0044, lines 10-12).

**Regarding claim 5:**

The data communication system of Claim 1, wherein:

- the data further comprises voice data (paragraph 0001, lines 1-2).

**Regarding claim 9:**

The data communication system of claim 1, wherein:

- the delays comprise RF delays (paragraph 0005, lines 7-11).

**Regarding claim 11:**

The data communication system of Claim 1, wherein:

- the delays comprise baseband delays (this limitation is inherit to be a baseband unit transceiver that has a delay. Please see paragraph 0066, lines 1-13) (paragraph 0338, lines 4-8).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tehrani et al. in view of Thompson et al. (IEE Proc.-Commun., Vol. 147, No.6, December 2000).

**Regarding claim 3:**

Tehrani et al. further discloses a data communication system (paragraph 0001, lines 1-2).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching the value of one of the nonzero delay is twice the value of the other nonzero delay.

However Thompson et al. in the same field of endeavor, teaches teaching the value of one of the nonzero delay is twice the value of the other nonzero delay (column 7, lines 6-13).

One of ordinary skill in the art would have clearly recognized that when two diversity antennas are used in the system, the delay diversity method is applied to the transmitted signals. In this method the time delay of L code is applied to the signal of the second antenna to generate an artificial multipath signal for 2L. Also, using this method will provide 2L diversity. To reduce the effect of multipath interference, it would

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have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique, which is the use of two transceivers in designing wireless network. Also as taught by Thompson, using the delay diversity method would reduce the multipath effect in the system. The diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not. Furthermore, it enhances the performance of the system in high interference areas such as multipath environment.

7. Claims 6, 7, 8, 10, 12, 13, 16, 17, 18, 19, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tehrani et al. in view of Joo et al. (US Patent Number 2003/0095533).

**Regarding claim 6:**

Tehrani et al. discloses a data communication system (paragraph 0001, lines 1-2).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching digital data.

However Joo et al. in the same field of endeavor, teaches the process of digital signal to make communication over propagation channel (digital transmission is interpreted to be digital data) (paragraph 0006, lines 19-24).

One of ordinary skill in the art would have clearly recognized that wireless communication network is capable of voice, data and digital data such as Internet and digital radio/TV broadcasting transmission. For transmitting digital data over wireless network, digital modems are used to modulate and demodulate the signals. To transmit and receive data over wireless network, it would have been obvious to one of ordinary skill in the art at the time the invention was made to design the system such that to be capable of any transmission such voice, data and digital data as taught by Joo et al. Receiving digital data via a wireless network will provide convenient way for exchanging information. Moreover, it offers to receive high-quality radio/TV broadcasting and high speed Internet access. Also, it is important to use the antenna diversity technique to ensure the quality of the transmission. Antenna diversity technique will increase the probability of receiving better signals from the source to the destination. Also it will reduce the multipath interference and improves the performance of the network.

**Regarding claim 7:**

Tehrani et al. further discloses:

- the data communication system (paragraph 0001, lines 1-2), wherein the RF signal path of the first antenna comprises an RF delay element (paragraph 0005, lines 7-11); and
- wherein the RF signal path of the third antenna comprises an RF delay element (paragraph 0005, lines 7-11).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching RF adder.

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However Joo et al. in the same field of endeavor, teaches an RF adder (figure 6, 614) for every antennas in the system.

One of ordinary skill in the art would have clearly recognized that wireless communication, to reduce the multipath interference in wireless communication system, and to increase the probability of receiving better signals, diversity technique is used in wireless communication system. Diversity requires two or more antennas for receiving and transmitting RF signals. When two or more antennas are used in the system, RF (radio frequency) adders are used to add the RF output of two or more transmitters into a single output. When using multiple antennas to transmit and receive data over wireless network, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use RF adders in the design of communication system as taught by Joo et al. In doing so, the RF adder would combine the RF output of two or more antennas into one single output. Moreover, RF adder technique is useful in reducing the number of antennas on a communication tower. Also, using RF adder will reduce the amount RF cables and coax in a communication network.

#### **Regarding claim 8**

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching wherein the transmitter further comprises at least one or more of a coder and a guard interval insertion processor; and wherein the receiver further comprises at least one or more of a decoder responsive to codes utilized by the coder and a guard interval recognition processor.

However Joo et al. in the same field of endeavor, teaches:

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- the data communication system the transmitter further comprises at least one or more of a coder (encoder is interpreted to be a coder) (paragraph 0008, lines 1-3) and a guard interval insertion processor (figure 2, 230, 240, paragraph 0008, lines 18-21); and
- wherein the receiver further comprises at least one or more of a decoder (paragraph 0063, lines 1-4) responsive to codes utilized by the coder and a guard interval recognition processor (figure 2; 230, 240, paragraph 0008, lines 18-21).

One of ordinary skill in the art would have clearly recognized that in a data wireless communication network system an encoder (coder) and decoders are used in transmit/receive device to generate bit stream or data in a code format. Also, along with encoder, guard interval is used to ensure distinct transmissions do not interfere with one another. Furthermore, it is used to reduce propagation delays in a multipath environment. To reduce the effect of multipath interference, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique which is the use of two transceivers and the use of encoder and guard interval as taught by Joo in designing wireless network. In doing so, the diversity technique ensures, if one transceiver is in radio frequency (RF) null the other is not. Furthermore, it enhances the performance of the system in high interference areas such as multipath environment.

**Regarding claim 10:**

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching wherein the delays comprise IF delays.

However Joo et al. in the same field of endeavor, teaches:

- the data communication system; wherein the delays comprise IF delays (this limitation is inherent because when the signal are converted from RF signals to IF (intermediate frequency) signals, they will experience some IF delays) (paragraph 0016, lines 5-9).

One of ordinary skill in the art would have clearly recognized that when the signals are transmitted from a transmitter due to the multipath phenomenon, it would experience delays in phase and amplitude. These delays are called RF delays. When the RF signal are received by the transceivers, they are converted into IF frequency signals. This will cause some IF delays in the system. To overcome these delays, antenna diversity and the use of encoders/decoder and guard interval are. To reduce the interference and delays in a multipath environment, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique which is the use of two transceivers and the use of encoder and guard interval as taught by Joo in designing wireless network such as WLAN. In doing so, the diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not. Also, it will reduce the IF delay in the system. Furthermore, it enhances the performance of the system in high interference areas such as multipath environment.

**Regarding claim 12:**

Tehrani et al. further discloses:

- an access point (paragraph 0024, lines 3-4) having a transceiver coupled to first and second transceiving antennae (figure 1, 120, 138, 140, paragraph 0044, lines 10-12),

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- the signal path of the first antenna exhibiting a different delay than the signal path of the second antenna (this limitation is inherent because in a multipath environment, the signal takes different paths from the source to get to destination and each of these signal experiences different delays and as a result each antenna experience different delays. Please see paragraph 0066, lines 1-13) (paragraph 005, lines 7-11); and
- one or more mobile terminals each having a transceiver coupled to third and fourth transceiving antennae (figure 1, 110, 122, 124, paragraph 0044, lines 10-12), the signal path of the third antenna exhibiting a different delay than the signal path of the fourth antenna (this limitation is inherent because in a multipath environment, the signal takes different paths from the source to get to destination and each of these signal experiences different delays and as a result each antenna experience different delays. Please see paragraph 0066, lines 1-13) (paragraph 005, lines 7-11).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching a WLAN system.

However Joo et al. in the same field of endeavor, teaches the wireless local area network (WLAN) system (paragraph 0006, line 22).

One of ordinary skill in the art would have clearly recognized that wireless communication is capable of both voice and data transmission. Also, wireless technology is used for high-speed transmission in wireless local area network (WLAN). When wireless technology is used for transmission of voice, data and video, the

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transmitted radio frequency (RF) signal would experience RF delays due to the multipath environment. To increase the probability of receiving better signals, diversity technique is used in wireless communication system. This technique requires the use of two or more antennas (receiver and transmitter) in the one physical housing, which is called a transceiver. To reduce the effect of multipath interference, the it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique which is the use of two transceivers as taught by Joo et al. in designing wireless network. In doing so, the diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not. Furthermore, it enhances the performance of the system in high interference areas such as multipath environment. Also, using wireless network such as WLAN technology would ensure the security of the transmission. It will also provide high-speed transmission for voice and data communication.

**Regarding claim 13:**

Tehrani et al. further discloses a nonzero delay of one of the signal paths of the first and second antennae is different from a nonzero delay of one of the signal path of the third and fourth antennae (this limitation is inherent because in a multipath environment, the signal takes different paths from the source to get to destination and each of these signal experiences different delays as a result each antenna experience different delays. Please see paragraph 0066, lines 1-13) (paragraph 005, lines 7-11).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching a WLAN system.

However Joo et al. in the same field of endeavor, teaches the wireless local area network (WLAN) system (paragraph 0006, line 22).

One of ordinary skill in the art would have clearly recognized that wireless communication is capable of both voice and data transmission. Also, wireless technology is used for high speed transmission in wireless local area network (WLAN) as well. When wireless technology is used for transmission of voice, data and video, the transmitted radio frequency (RF) signal would experience RF delays due to the multipath environment. To increase the probability of receiving better signals, diversity technique is used in wireless communication system. This technique requires the use of two or more antennas (receiver and transmitter) in the one physical housing which is called a transceiver. To reduce the effect of multipath interference, the it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique which is the use of two transceivers as taught by Joo et al. in designing wireless network. In doing so, the diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not. Furthermore, it enhances the performance of the system in high interference areas such as multipath environment. Also, using wireless network such as WLAN technology would ensure the security of the transmission. It will also provide high-speed transmission for voice and data communication.

**Regarding claim 16:**

Tehrani et al. further discloses the use of transceiver (paragraph 0044, lines 10-12).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching a WLAN and OFDM system.

However Joo et al. in the same field of endeavor, teaches the WLAN (paragraph 0006, line 22) and OFDM system (paragraph 0005, lines 1-2).

One of ordinary skill in the art would have clearly recognized when radio frequency (RF) signals are transmitted over a wireless channel, due to the obstacle such as walls, buildings, trees and etc, the RF signal would take different paths from the source to get to the destination. As a result, the signal experience delays in phase, amplitude and time. To reduce the multipath interference in wireless communication system, and to increase the probability of receiving better signals, diversity technique is used in wireless communication system. Diversity technique is the use of two or more antennas for receiving and transmitting RF signals. These antennas are capable of both transmission (receive and transmit) and are called transceiver. To reduce further the effect of multipath interference, OFDM technique is used in the transceiving device. The diversity technique in an OFDM transceiving device, will ensure the probability of receiving better signal. To reduce the effect of multipath interference, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use diversity and OFDM techniques as taught by Joo et al. to overcome multipath interference in the network. Antenna diversity and OFDM techniques will increase the probability of receiving better signals from the source to the distention. Also it will improve the performance of the network.

**Regarding claim 17:**

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching wherein the OFDM system utilizes one of binary phase shift keying (BPSK), quadrature phase shift keying (QPSK), 16- quadrature amplitude modulation (16-QAM) or 64-QAM.

However Joo et al. in the same field of endeavor, teaches the WLAN system (paragraph 0006, line 22) and the OFDM system (paragraph 0005, lines 1-2) utilizes one of binary phase shift keying (BPSK), quadrature phase shift keying (QPSK), 16- quadrature amplitude modulation (16-QAM) or 64-QAM (paragraph 0008, lines 9-13).

One of ordinary skill in the art would have clearly recognized when using WLAN for transmitting extremely high-speed data, the OFDM modulation technique is used. This technique allows the high-speed transmission to occur over multiple frequency channels. Also, OFDM modulation further modulate the signal using other modulation techniques such as QPSK, BPSK, 16-QAM and 64-QAM. Using these modulation along with antenna diversity techniques, will reduce the effect of the multipath interference and delays the system. To increase the probability of receiving better signal, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the antenna diversity and OFDM, QPSK, BPSK, 16-QAM and 64-QAM modulation techniques as taught by Joo et al. to overcome multipath interference in the network. Antenna diversity and OFDM techniques will increase the probability of receiving better signals from the source to the distention. Also it will improve the performance of the network.

**Regarding claim 18:**

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Tehrani et al. further discloses the use of transceivers (paragraph 0044, lines 10-12).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching WLAN and one or more of a coder and a guard interval insertion processor; and at least one or more of a decoder responsive to codes utilized by the coder and a guard interval recognition processor.

However, Joo et al. in the same field of endeavor teaches WLAN (paragraph 0006, line 22) and one or more of a coder and a guard interval insertion processor (encoder is interpreted to be a coder) (paragraph 0008, lines 1-3); and at least one or more of a decoder responsive to codes utilized by the coder (paragraph 0063, lines 1-4) and a guard interval recognition processor (figure 2, 230, 240, paragraph 0008, lines 18-21).

One of ordinary skill in the art would have clearly recognized that in a data wireless communication network system such as WLAN an encoder (coder) and decoders are used in transmit/receive device to generate bit stream or data in a code format. Also, along with encoder, guard interval is used to ensure distinct transmissions do not interfere with one another. It is used to reduce propagation delays in a multipath environment. To reduce the effect of multipath interference, the it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique which is the use of two transceivers and the use of encoder and guard interval as taught by Joo in designing wireless network. In doing so, the diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not.

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Furthermore, it enhances the performance of the system in high interference areas such as multipath environment.

**Regarding claim 19:**

Tehrani et al. further discloses RF delays (paragraph 0005, lines 7-11).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching a WLAN system.

However Joo et al. in the same field of endeavor, teaches the wireless local area network (WLAN) system (paragraph 0006, line 22).

One of ordinary skill in the art would have clearly recognized that wireless communication is capable of both voice and data transmission. Also, wireless technology is used for high speed transmission in wireless local area network (WLAN) as well. When wireless technology is used for transmission of voice, data and video, the transmitted radio frequency (RF) signal would experience RF delays due to the multipath environment. To increase the probability of receiving better signals, diversity technique is used in wireless communication system. This technique requires the use of two or more antennas (receiver and transmitter) in the one physical housing which is called a transceiver. To reduce the effect of multipath interference, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique which is the use of two transceivers as taught by Joo et al. in designing wireless network. In doing so, the diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not. Furthermore, it enhances the performance of the system in a high interference areas such as multipath environment.

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Also, using wireless network such as WLAN technology, would ensure the security of the transmission. It will also provide high speed transmission for voice and data communication.

**Regarding claim 20:**

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching wherein the delays comprise IF delays.

However Joo et al. in the same field of endeavor, teaches the WLAN system (paragraph 0006, line 22), wherein the delays comprise IF delays (this limitation is inherent because when the signal are converted from RF signals to IF (intermediate frequency) signals, they will experience some IF delays. Please see paragraph 0066, lines 1-13) (paragraph 0016, lines 5-9).

One of ordinary skill in the art would have clearly recognized that when the signals are transmitted from a transmitter due to the multipath phenomenon, it would experience delays in phase and amplitude. These delays are called RF delays. When the RF signal are received by the transceivers, they are converted into IF frequency signals. This will cause some IF delays in the system. To overcome these delays, antenna diversity and the use of encoders/decoder and guard interval are. In a multipath environment, to reduce the interference and delays, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique which is the use of two transceivers and the use of encoder and guard interval as taught by Joo in designing wireless network such as WLAN. In doing so, the diversity technique ensures if one transceiver is in radio frequency (RF) null the

other is not. Furthermore, it enhances the performance of the system in high interference areas such as multipath environment.

**Regarding claim 21:**

Tehrani et al. further discloses baseband delays (this limitation is inherent to be a baseband unit transceiver that has a delay. Please see paragraph 0066, lines 1-13) (paragraph 0338, lines 4-8).

Tehrani et al. discloses all of the subject matter as described above except for specifically teaching a WLAN system.

However Joo et al in the same field of endeavor, teaches the wireless local area network (WLAN) system (paragraph 0006, line 22).

One of ordinary skill in the art would have clearly recognized that wireless communication is capable of both voice and data transmission. Also, wireless technology is used for high speed transmission in wireless local area network (WLAN) as well. When wireless technology is used for transmission of voice, data and video, the transmitted radio frequency (RF) signal would experience RF delays due to the multipath environment. To increase the probability of receiving better signals, diversity technique is used in wireless communication system. This technique requires the use of two or more antennas (receiver and transmitter) in the one physical housing which is called a transceiver. These transceivers include RF and baseband units to convert data to electrical signals. This process causes delays in the system such as baseband delay. To reduce the effect of multipath interference, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity

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technique which is the use of two transceivers as taught by Joo et al. in designing wireless network. In doing so, the diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not. Furthermore, it enhances the performance of the system in a high interference areas such as multipath environment. Also, using wireless network such as WLAN technology, would ensure the security of the transmission. It will also provide high speed transmission for voice and data communication.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tehrani et al. and Joo et al. as applied to claim 12 and 13 above, and further in view of Thompson et al. (IEE Proc.-Commun., Vol. 147, No.6, December 2000).

**Regarding claim 14:**

Joo et al. further discloses WLAN (paragraph 0006, line 22).

Joo et al. discloses all of the subject matter as described above except for specifically teaching the value of one of the nonzero delay is twice the value of the other nonzero delay.

However Thompson et al. in the same field of endeavor, teaches the value of one of the nonzero delay is twice the value of the other nonzero delay (column 7, lines 6-13).

One of ordinary skill in the art would have clearly recognized that when two diversity antennas are used in the system, the delay diversity method is applied to the transmitted signals. In this method the time delay of L code is applied to the signal of the second antenna to generate an artificial multipath signal for 2L. Also, using this method will provide 2L diversity. To reduce the effect of multipath interference, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique, which is the use of two transceivers in designing wireless network. Also as taught by Thompson, using the delay diversity method would reduce the multipath effect in the system. The diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not. Furthermore, it enhances the performance of the system in a high interference areas such as multipath environment.

9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tehrani et al. and Joo et al. as applied to claim 12 above, and further in view of Thompson et al. and Krishnamurthy et al. (0-7803-3002-1/95 \$4.00(c) 1995 IEEE).

**Regarding claim 15:**

Joo et al. further discloses WLAN (paragraph 0006, line 22).

Joo et al. discloses all of the subject matter as described above except for specifically teaching the multiple antennas and different delays provide an (LL) diversity exhibiting  $2L$  diversity plus  $10\log_{10}(L)$  dB performance.

However Thompson et al. in the same field of endeavor, teaches the multiple antennas and different delays provide an (LL) diversity exhibiting  $2L$  diversity (column 7, lines 6-13).

Thompson et al. discloses all of the subject matter as described above except for specifically teaching diversity plus  $10\log_{10}(L)$  dB performance.

However Krishnamurthy et al. in the same field of endeavor diversity plus  $10\log_{10}(L)$  dB performance (column 6, lines 7-8)

One of ordinary skill in the art would have clearly recognized that when two or more diversity antennas are used in the system, the delay diversity method is applied to the transmitted signals. In this method the time delay of  $L$  code is applied to the signal of the second antenna to generate an artificial multipath signal for  $2L$  plus  $10\log_{10}(L)$  dB performance. Also, using this method will provide  $2L$  diversity. To reduce the effect of multipath interference, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the diversity technique, which is the use of two transceivers in designing wireless network. Also as taught by Thompson and Krishnamurthy, using the delay diversity method would reduce the multipath effect in the system. The diversity technique ensures if one transceiver is in radio frequency (RF) null the other is not. Furthermore, it enhances the performance of the system in a high interference areas such as multipath environment.

***Conclusion***

**10 THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kabir A. Timory whose telephone number is 571-270-1674. The examiner can normally be reached on 6:30 AM - 3:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kabir A. Timory  
July 20, 2007



**SHUWANG LIU**  
**SUPERVISORY PATENT EXAMINER**